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The Economic Analysis of Sector Investment Programs

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Economic analysis of sector investment programs should use appropriate criteria — including a clear public rationale for the expenditure, . motivated by a desire either to correct a market failure or to alleviate poverty. Otherwise public spending simply crowds out private supply, resulting in few net benefits to the economy.

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Summary findings

One of the main objectives of a sector investment (or expenditure) program is to improve the development impact of public spending in a sector. Suthiwart-Narueput focuses on how to use economic analysis to help sector investment programs improve the development impact of public spending. He uses Kenya as a case study.

The analysis emphasizes using standard principles of public expenditure analysis to identify desirable changes in a sector spending program and to evaluate the degree to which the planned spending program incorporates those changes.

One of the most important criteria is that such planned expenditures should have a clear public rationale, motivated by a desire either to correct a market failure or to alleviate poverty. Otherwise public spending simply crowds out private investments, resulting in few net benefits to the economy.

Cost recovery may be considered desirable, for example, because it alleviates the government's fiscal constraint, ensures that a good or service yields a minimum level of benefits, and encourages a supply response from the private sector. But if the private benefits of the service are less than the costs, it would be better to transfer the resources representing the cost of the service directly to the poor (subsidizing inefficient services is not propoor). The good or service subsidized should be consumed more by the poor than by others, and within those services there should be a self-selection mechanism that targets the services to the poorest. If subsidized goods and services fail to meet these criteria, spending should be directed toward other activities more likely to alleviate poverty.

There should be a reasonable relationship between spending and outcomes. Sometimes it is easiest to assess expenditure tradeoffs by looking at costs relative to other benchmark interventions (such as the cost of educating a child). In Kenya, for example, the budget for agricultural extension alone was double the entire budget for the Ministry of Transport and Communications.

Key economic indicators should reflect the key rationale: correcting for market failures or alleviating poverty. Performance indicators should also be assessed relative to a specific counterfactual (what would the outcome have been without that expenditure). Control groups should be incorporated into program design from the outset.

This paper — a product of Public Economics, Development Research Group — is part of a larger effort in the group to improve the analysis of public expenditures and projects. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Cynthia Bernardo, room MC2-501, telephone 202-473-1148, fax 202-522-1154, Internet address cbernardo@worldbank.org. The author may be contacted at ssuthiwartnarueput @worldbank.org. September 1998. (16 pages)

The Economic Analysis of Sector Investment Programs

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1. Introduction

This paper discusses the economic analysis of sector investment or expenditure programs, collectively referred to as SIPs henceforth. There are many different views as to what actually constitutes a SIP. For the purposes of this paper, the essential feature of a SIP that we focus on is that the Government, World Bank, and other donors jointly finance an agreed-upon forward sectoral expenditure program.[1] A SIP may also have many different objectives. Again, for the purposes of this paper, a critical objective of a SIP is to improve the development impact of public expenditures in the sector.[2]

The paper is organized as follows. Section 2 proposes a methodology for the economic analysis of SIPs which emphasizes evaluating the sectoral expenditure program based on principles of public expenditure analysis. Particular emphasis is placed on identifying the rationale for public intervention and improving cost-recovery. Section 3 discusses alternative methodologies, e.g., cost-benefit analysis. Section 4 applies the proposed methodology to the Kenya Agricultural SIP. Section 5 concludes.

2. SIPs and Economic Analysis

Objective

While there are several advantages to a SIP (e.g., improved donor coordination, increased local ownership),[3] a critical objective of a SIP is to improve the development impact of public expenditures in the sector through expenditure reallocation and process improvements. The methodology for the economic analysis follows from this objective.

It is much more difficult for project-specific lending than SIPs to improve the quality of the overall public expenditure portfolio. However, it is precisely this improvement which represents the true development impact of World Bank lending because of the fungibility of financial resources. A World Bank project may have a high net present value (NPV) or internal rate of return (IRR), but this may not represent the development impact of the loan. If the World Bank is funding a project which would have been undertaken by the Government anyway, the World Bank would implicitly be funding some other, marginal project which could have a much lower NPV or IRR.[4]

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[1] This is only one aspect of a SIP, which may also have other important features. For the Africa Region, six features define a "genuine" SIP: (i) sectorwide scope; (ii) clear sector strategy; (iii) led by local stakeholders; (iv) participation of all donors; (v) common implementation arrangements; and (vi) use of local capacity rather than technical assistance.

[2] Again, this is only one of several possible objectives. The Africa Region sees the SIP as "an instrument for overcoming weakness in the management of development assistance . . . . These include lack of ownership . . . weak public expenditure management, and fragmented management of donor assistance." (Africa region web site).

[3] See Harrold et al. (1995).

[4] See, for example, Devarajan, Squire, and Suthiwart-Narueput (1997). It should be emphasized that while a SIP may help address intrasectoral fungibility, it does not address intersectoral fungibility.

By contrast, improvements to the overall quality of the public expenditure portfolio would have a large development impact. Reducing expenditures on unproductive activities could have as large a development impact as lending to increase expenditures on productive ones. Hence the emphasis on expenditure reallocation. Note that since there is no necessary analytical link between expenditure reallocation and the size of lending, expenditure reallocation via SIPs may be a way to maximize the development impact per dollar of World Bank lending.

Methodology

The methodology for the economic analysis follows from the above objective. First, the economic analysis should evaluate the current expenditure program to identify what changes are appropriate. Second, the analysis should indicate how these changes are incorporated into the (forward) expenditure program proposed under the SIP. This is especially important because the net benefits of the SIP are given by the *changes* to the expenditure program, and not by the quality of the overall expenditure program.

Evaluate the Public Expenditure Program

The economic analysis should evaluate the public expenditure program to determine the appropriate changes to the proposed expenditure program. The reallocation of expenditures should be guided by the following principles. First, there should be a clear public rationale for public expenditure in the sector. Expenditures should be clearly motivated on grounds of either market failure (public goods and externalities) or redistribution. Otherwise, public provision simply crowds out private supply resulting in few net benefits to the economy. Second, there should be a reasonable relationship between expenditures (costs) and outcomes (benefits).

A useful first step is to classify sectoral public expenditures in terms of whether they are largely public (public goods and externalities) or largely private. Of course, the boundaries between public and private are not hard and fast, and such a classification is ultimately a matter of judgment. But it nonetheless focuses the discussion on the proper set of issues. A useful starting point may be a three-part expenditure classification in terms of whether they are "largely public," "largely private," or "private with large externalities."

The key test for public goods is nonexcludability.[5] If it is hard to exclude others from enjoying the benefits of the good or service, e.g., national defense, rural roads, then it is likely to be a public good. Expenditures on true public goods are likely to be relatively limited. A typical public expenditure program will include a large amount of expenditures on private goods and services, which the government may claim generates large externalities.[6] Because externalities are difficult to measure, debating the size of externalities associated with different

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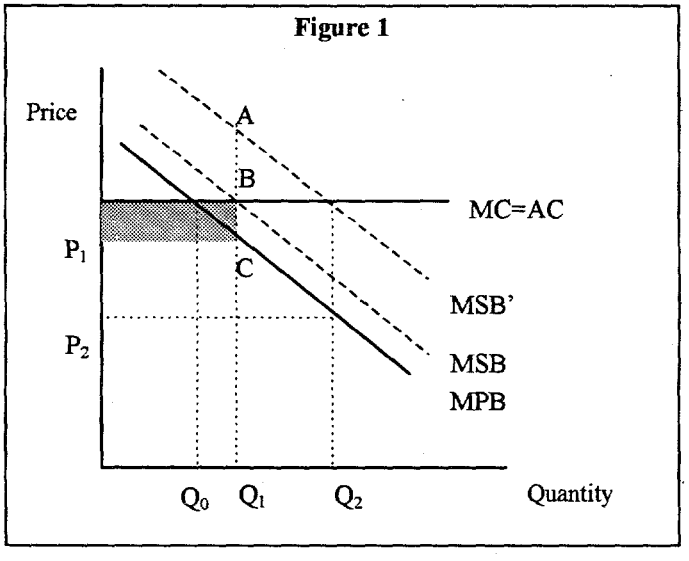
[5] Pure public goods are those whose benefits are also nonrival, i.e., one's enjoyment of that good or service does not take away from another's enjoyment (e.g., an uncongested public park).

[6] Technically speaking, virtually all goods have externalities. When my colleague purchases and wears an ugly necktie, he generates negative (consumption) externalities for me. However, from a practical standpoint, no one is likely to recommend a tax on the purchase of private goods such as neckties, no matter how ugly they are.

types of expenditure could be counterproductive. A more fruitful approach may be to focus instead on improving cost recovery and reducing *net* public expenditure on these items. Beneficiaries of public expenditures with externalities nonetheless receive some private benefits from the expenditure. At a *given* level of government provision, cost recovery should occur up to the level of the beneficiaries' willingness-to-pay regardless of the size of the externality.

In Figure 1 the government provides quantity Q_1 of a good with a positive externality. Since the size of the externality is unknown, the marginal social benefit (MSB) could be either *A* or *B*. However, the marginal private benefit (MPB) is still *C*. This is the beneficiaries' willingness-to-pay for the good. Given the quantity level, the government should charge the MPB or the willingness-to-pay, P_1, regardless of the size of the externality.[7] Box 1 discusses why charging for services and cost recovery is so important. [8]

Figure 1



[7] Cost recovery is still only partial since there is a subsidy corresponding to the shaded rectangle.

[8] Absent equity considerations, which are discussed separately below.

Box 1. The Importance of Cost Recovery

Cost recovery is important for at least three reasons.

First, it alleviates the government's fiscal constraint. Pricing at less than consumers' willingness-to-pay results in an additional transfer from the public to private sector. Since governments have to raise funds through distortionary taxes, such transfers may have a welfare cost. While transfers may nonetheless be desirable for poverty alleviation purposes, given the welfare costs involved the burden of proof should be on those who argue for pricing below MPB.

Second, it ensures that the good or service provided yields a minimum level of benefits. Consider a publicly provided service which is priced to recover only 10 percent of its costs. If there is no demand for it at that price, this implies that the private benefits generated by this service are less than 10 percent of what it costs to provide the service. Unless the size of the externality (the difference between MSB and MPB) is over nine times the size of the private benefits, the government should reallocate expenditures toward other services.

Third, it encourages a supply response from the private sector. Even if the quality of publicly provided services is low, it is difficult for the private sector to compete if the service is provided free-of-charge. Partially charging for publicly provided services would increase the likelihood of entry by competing private providers. Such entry could also encourage public providers to improve the quality of their services.

This conclusion is not contingent upon providing the optimal quantity of the good. If MSB is greater (less) than MC at that quantity, the government should increase (decrease) the quantity provided.[9] However, since the size of the externality and the location of MSB are unknown, in general the optimal quantity to provide will also be unclear. But for any given quantity, the government should charge the MPB or willingness-to-pay.

The above might appear to contradict the usual recommendation that goods or services with positive externalities should be subsidized. Note that the externality depends upon the quantity consumed or provided. If this quantity does not change in response to a subsidy, then there is no efficiency rationale for the subsidy. In the case where the good or service is provided by the private sector, a consumption subsidy BC will increase the quantity provided from Q_0 to the socially efficient level Q_1. In the case where the good or service is provided by the government—as is the case here since it appears in the public expenditure portfolio—there is no guarantee that charging less will increase the quantity actually consumed or provided. A typical situation with many publicly provided services is that quantities are rationed anyway because demand already exceeds supply since pricing is so low. In such a situation, charging less simply results in an additional transfer to the private sector with little improvement in economic efficiency.

While less cost recovery may be justified on grounds of poverty alleviation, it should pass several criteria. First, if the private benefits of the service are less than the costs, it would be preferable to transfer the resources represented by the cost of the service directly to the poor. Subsidizing inefficient services is not pro-poor. Second, the good or service being subsidized should be consumed relatively more by the poor. Third, within those services, there should be a self-selection or other mechanism which targets the services toward the poorest. If

[9] If the true MSB curve were MSB', for example, the government could improve welfare by increasing the quantity provided to Q_2.

subsidized goods and services fail to meet these criteria, expenditures should instead be directed toward other activities which may have a stronger poverty alleviation impact.

There should also be a reasonable relationship between expenditures and outcomes. The analysis can use either time-series or cross-sectional data to assess whether increased expenditures lead to improved sectoral outcomes or indicators. Have higher extension expenditures led to increases in farm yields or value added? Have increased expenditures on teachers' salaries resulted in improved literacy or enrollment rates? In health, for example, Hammer et al. (1995) conducts a cross-provincial analysis of different types of public expenditures against such outcome measures as infant mortality. Interestingly, he finds that expenditures on public doctors have a negligible impact on infant mortality, whereas expenditures on safe water and sanitation have a very strong beneficial impact.

In the absence of sufficient data to conduct expenditure-outcome analyses, selected cost-benefit analyses can indicate the relative desirability of different types of interventions (Box 2).

Box 2. Using Costs to Evaluate Expenditure Tradeoffs

Because the benefits of truly *public* expenditures are by nature difficult to value and quantify (e.g., externalities and poverty alleviation), it is often difficult to evaluate public expenditures using standard cost-benefit analysis. Nonetheless, it is important for the policymaker to be able to assess somehow the tradeoffs between different kinds of expenditures.

A useful input into the assessment of these tradeoffs is to look at the *costs relative to other benchmark interventions*, e.g., the cost of educating a child. Whereas it is difficult to value and quantify the benefits of any given project, we can at least quantify its costs in terms of (say) the number of children that we could have educated with the funds from that given project. This "foregone number of children educated" may provide a useful input for policymakers to begin assessing the necessary tradeoffs between different public interventions given scarce budgetary resources. The following are a few examples of how costs can provide useful information in evaluating tradeoffs:

In **Yemen**, traders benefited far more than consumers from the large wheat and flour subsidy. The budgetary cost of the subsidy was 5.4 percent of GDP. By contrast, total public expenditures on health were only 1.2 percent of GDP. Given that infant mortality in Yemen was 117—almost double the average for low income countries—one can question whether this was an appropriate tradeoff to make.

In **Kenya**, agricultural extension alone cost 141.9 million KP in the 1997/98 budget (estimates). This is double the entire budget for the Ministry of Transport and Communications (70.1 million in the 1996/97 estimates).

In **Gabon**, the costs of the institutional strengthening component of a forestry and environment project represented US$ 60,000 per staff (of 350), or roughly 20 times the per capita GNP.

Incorporate Evaluation Results into Forward Expenditure Program

The economic analysis should indicate how the forward budget reflects the results of the expenditure evaluation. For example, the public versus private classification of expenditures should have clear implications for the forward budget. Items that are largely public goods and services should remain in the forward budget. The forward budget should include adequate operations and maintenance expenditures on these items to ensure that they remain fully

funded. Goods and services that are largely private should be privatized. The phasing out of such activities from the public portfolio should be clearly reflected in the forward budget. Goods and services with large externalities may remain in the forward expenditure portfolio. However, pricing and cost recovery should be improved. Clear cost-recovery targets for these expenditure items should be indicated in the forward budget.

Expenditures should also be reallocated to reflect the results of the expenditure-outcome analysis. In the case of health expenditures discussed above, for example, if lower infant mortality is the desired outcome, expenditures should be reallocated away from publicly provided doctors and toward safe water and sanitation.

The above discussion focuses on the functional composition of expenditures (i.e., by program or activity). However, the forward budget should also reflect evaluation results regarding the economic (e.g., wage versus nonwage expenditures) or geographic (e.g., by province or district) composition of expenditures. A common finding, for example, is that the wage bill crowds out nonwage operations and expenditure expenditures, resulting in inefficient service delivery. Another is that expenditures on publicly provided private goods and services tend to be biased toward richer rather than poorer areas. Such improvements in the economic and geographic composition of expenditures should also be clearly incorporated into the proposed expenditure program.

Aside from expenditure reallocation, it may also be important to incorporate process changes. Poor observed expenditure-outcome relationships may be the result of high inefficiency in service delivery. Such process improvements could include institutional changes to improve the incentives for public service delivery. While it is extremely difficult to know what changes are appropriate (arguably a strong candidate for the Holy Grail of development economics), setting clear and binding performance criteria for different expenditure components may at least encourage appropriate incentives among higher-level government officials. Box 3 discusses several issues pertaining to performance indicators.

Linking the forward budget with the evaluation results in this manner allows the

Box 3. Performance Indicators

Expenditure reallocation should be accompanied by clear performance criteria attached to different expenditure categories in the forward expenditure program. While much has been written about performance indicators (see, for example, the Performance Monitoring Indicator Handbook issued by OPR/OCS), there are at least two important points that often get slighted in the usual discussion regarding input/output/outcome indicators (see Squire et al. 1997).

First, the choice of which key indicators to monitor should flow from the rationale for the expenditure. As mentioned earlier, in the case of the public expenditure program, the choice of indicator should link back to one of two rationales—market failure and poverty alleviation. An primary education project motivated on externality grounds should focus on the indicator which most closely drives the externality, e.g., basic literacy. Conversely, an agricultural extension project motivated on poverty alleviation grounds should focus on household income among poorer farmers.

Second, performance indicators need to be assessed relative to a well-specified counterfactual, i.e., what would the world have looked like in the absence of that expenditure. One way to specify a counterfactual is to construct control groups. Given their importance for monitoring and evaluation, control groups should be incorporated into the design of the program from the outset.

economic analysis to explicitly inform project design, rather than act simply as an ex post justification for the project. Of course, to a large degree, the forward budget will reflect political rather than economic considerations. Nonetheless, the more the forward budget incorporates the changes suggested by the expenditure evaluation, the greater the net benefits of the SIP. This is because the net benefits of a SIP are given by the *changes* to the expenditure program, and not of the expenditure program as a whole. The benefits and costs of the entire expenditure program represent the effect of total government spending, where the implicit counterfactual is no government spending. Because the benefits and costs of changes to the program represent the effect of World Bank participation, where the counterfactual is no World Bank involvement, the latter is the relevant focus of the economic analysis.

Expenditure changes are identified by comparing the proposed forward to a counterfactual expenditure program. By their nature, the latter is difficult to specify precisely and requires considerable judgment. For example, should the counterfactual program include donor financing? If it is believed, for example, that World Bank or donor financing would not be forthcoming in the absence of a SIP, then the counterfactual expenditure program should not include World Bank or donor financing. Furthermore, even the domestically financed portion of the public expenditure program may itself change in response to the absence of donor financing. To focus the analysis and avoid near-metaphysical speculation, it may be more practical to assess first the changes relative to the historical expenditure program, then discuss the major areas where the counterfactual program is likely to diverge from the historical program.

Conceptually, if we denote the net present value of the proposed expenditure program under the SIP as NPV_1 and that of the counterfactual expenditure program as NPV_0, the net benefit of the SIP is $NPV_1 - NPV_0$. This has several important implications. *First, weaknesses in the current expenditure program do not in themselves argue against a SIP.* If the SIP leads to significant positive changes to the expenditure program, the marginal development impact of lending may be very high. *Second, the size of the net benefits could have little to do with the size of the loan.* Consider an extreme example where the only change to the expenditure program is a reduction in unproductive expenditures. In this case, $NPV_1 > NPV_0$ and net benefits are positive, but less funds are required. Third, while the net benefits are given by expenditure changes, it most instances it will be very difficult to quantify these net benefits in terms of a NPV. As discussed below, a cost-benefit analysis of an entire SIP is likely to be rather difficult and possibly even counter-productive.

3. Other Approaches to the Economic Analysis of SIPs

Cost-Benefit Analysis

It is likely to be very difficult to conduct a cost-benefit analysis of an entire SIP. Since the net benefits of the SIP are given by $NPV_1 - NPV_0$, this would require assessing the net present value of both the entire factual and counterfactual program of expenditures, i.e., $NPV_i = \sum_j \sum_t (B_{jt} - C_{jt}) / (1+r)^t$ where B_{jt} and C_{jt} refer to benefits and costs of project (or component) j at time t of expenditure program i. To do the former properly would be quite impractical; the latter almost infeasible. To make the task feasible, one could assume that the

bulk of the expenditure program stays unchanged, and only assess the NPV of the projects or components which were added or dropped to get at $NPV_1 - NPV_0$. However, even this is extremely difficult because the kinds of expenditure changes that are likely to be recommended in a SIP are difficult to quantify in NPV terms. Three examples are discussed.

First, the proposed expenditure program should reduce expenditures on private goods and services. But what is the value in *NPV* terms of eliminating private goods from the public budget? At a minimum, this would require assessing the extent of crowding out caused by public provision, productivity and pricing differences between public and private provision, and the fiscal impact and distortionary cost of taxation.[10] Second, a rationalized expenditure program is also likely to include reductions in excess personnel and increases in nonwage expenditures. Again, the NPV of such a reallocation would be very difficult to quantify properly.[11] Lastly, improving the poverty incidence of expenditures is clearly beneficial. However, quantifying these benefits as a NPV would require the use of distributional weights. The appropriate set of weights to use is unclear, but would drive much of the result. Box 4 discusses other difficulties with cost-benefit analysis, with particular reference to agricultural extension projects.

Break-Even Growth Rate: Zambia ASIP

The ex ante economic analysis for the Zambia Agricultural Sector Investment Program (ASIP) used a different approach based on calculating the minimum growth rate in agricultural GDP required to justify the ASIP investment. These minimum growth rates are then compared to historical growth rates and total factor productivity (TFP) growth achieved by other countries in the region to justify the investment.

There are several problems with such an approach to the economic analysis of SIPs. First, the calculation requires some strong assumptions regarding the cost and benefit streams.[12] Second, the methodology implicitly favors smaller SIP investments since the break-even growth rate required will be correspondingly lower. Third and most importantly, *this type of economic analysis does not explicitly inform the design of the program*. For example, the calculation assumes that the current level of expenditure in the sector is the minimum level

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[10] The reason for the last is the following. Initially, let the private goods be provided from the public budget below cost, resulting in a net fiscal drain. Suppose that privatization means that the exact same goods are now privately provided on a commercial basis. Absent productivity improvements, the key difference is that costs previously borne by the public sector are now transferred to private consumers of that good. In the presence of distortionary costs of taxation, there will be a net benefit from increased cost recovery or privatization given by the lower distortionary costs of the reduced fiscal drain.

[11] The value of personnel reductions depends upon the counterfactual. Take the extreme case where surplus personnel produce nothing in the public sector, but would otherwise be unemployed. Absent equity and leisure considerations, the effect of eliminating such personnel from the public payroll would again be a reduction in the fiscal drain previously transferred from the public sector to private agents. If the surplus personnel could find gainful employment (and private labor markets are undistorted), then the benefit is given by the full fiscal impact, not just the benefit of the distortionary costs of taxation associated with the fiscal improvement.

[12] On the cost side, the incremental cost of the ASIP program is calculated as the difference between the total cost of ASIP and the minimum level of public expenditure required to maintain agricultural GDP at existing levels, which is assumed to be the current level of expenditure. On the benefit side, it is assumed that the ASIP investment produces constant GDP growth for a period of eight years.

required to maintain agricultural GDP at existing levels. This implicitly assumes that there are no unproductive sectoral public expenditures, whereas an important objective of a SIP is to identify and reduce such expenditures.

Box 4. Cost-Benefit versus Economic Analysis: An Application to Agricultural Extension

Cost-benefit analysis is only one possible component of economic analysis. Consider the cost-benefit analysis of a typical agricultural project. Costs usually include off-farm (e.g., the costs of public extension) and on-farm (e.g., increased fertilizer, labor inputs) costs. Benefits are typically modeled by the increased on-farm profits due to increased yields.

There are several problems with this type of cost-benefit analysis. First, since the benefits are all on-farm benefits they are essentially private in nature. There is no distinction between the public versus private benefits of intervention. In the case of publicly provided extension, for example, the relevant measure of benefits should be the size of the informational externality or the extent of poverty alleviation. As typically calculated, a high *private* rate of return is not necessarily a justification for public investments in extension.

Second, the appropriate time profile of benefits is unclear. There appears to be no generally accepted view for how long the benefits should accrue. In principle, the time path of benefits from extension should be given by how much earlier the farmer obtained access to information with extension as opposed to without. If one assumes that the farmer obtains information via extension that he would have obtained in n years anyway, then benefits should only accrue for n years. By contrast, if one assumes that the farmer would never have received the information which was provided by extension, the benefit stream could be a perpetuity. In appraisal reports, one finds many different assumptions regarding the number of years. In practice, differences in the number of years of the benefit stream make a large difference in the NPV calculation.

Third, this type of analysis abstracts completely from important institutional differences. There is a strong "black box" aspect to the relationship between public costs incurred and private benefits realized. This is unfortunate because in most of these NPV calculations, private benefits from yield increases are so large that *if realized*, they overwhelm public costs incurred. The critical risk is therefore whether the benefits (yield increases) get realized or not. Much of this will depend upon institutional features which are ignored in typical cost-benefit analyses, e.g., what are the incentives in place for the extension agents to get farmers to realize such yield increases? The Comoros Agricultural Extension Pilot Project had innovative features to improve such incentives by introducing competition from nongovernmental extension services alongside public extension services. By contrast, the Kenya National Extension Project II had no such features. Yet the cost-benefit analyses for these two significantly different approaches to extension looked virtually the same on paper. The cost-benefit analysis of the Kenya National Agricultural Research Project took a similar approach of linking off-farm public research costs with private, on-farm benefits. It is somewhat surprising that the analysis for a research project appear so similar to that of an extension project. The outputs produced by the two services are quite different. There are also many intermediate steps between the generation of research and the realization of yield increases by farmers. The links between the research and extension services rarely appear seamless. What are the incentives for the research service to generate technology that is appropriate for the extension service and the farmers?

Cost-benefit is only one aspect of economic analysis. Economic analysis should ask broader questions not typically addressed by cost-benefit analysis. On the public versus private issue, economic analysis should assess the rationale for public intervention and whether the intervention is the most appropriate means of addressing that rationale. With regard to extension, for example, if the rationale is an informational externality, a public subsidy to private extension—as opposed to free provision of public extension—may be appropriate. If the rationale is poverty alleviation, extension should be compared to other means of alleviating poverty (e.g., education, public works). At a minimum, mechanisms should be put in place to ensure that the benefits of extension accrue more to poorer rather than better-off farmers. On the issue of institutional arrangements, economic analysis should focus heavily on assessing whether the various agents involved have the proper incentives to realize the desired outcomes.

4. The Case of the Kenya Agricultural SIP

An economic analysis along the above lines was conducted for the Kenya Agricultural SIP. The following is not meant to be comprehensive, but indicative of the kind of analyses that may be useful in the economic analysis of a SIP.[13]

Evaluate Expenditures

The focus of the Kenya ASIP is on expenditures by the Ministry of Agriculture, Livestock Development and Marketing (MOALDM).[14] Table 1 classifies ministry expenditures into overhead and three other categories: (i) public goods; (ii) private goods with significant externalities; and (iii) private goods. Examples of expenditures on public goods include regulatory (e.g., Kenya Plant Health Inspectorate, holding ground services) and disease control (e.g., tsetse and tick control services) functions. Expenditures on private goods with significant externalities include training institutes and extension services. Expenditures on largely private goods and services include artificial insemination, agricultural mechanization, and veterinary clinical services. While any precise classification is a matter of judgment, it appears reasonably clear that a large proportion of MOALDM expenditures is on nonpublic goods and services.

Table 1. MOALDM Expenditures
(percent)

KP 000s	*Actual 1995/96*
Shares	
Overhead	16
Largely public	17*
Private with externalities	56
Largely private	12*

* Preliminary.
Source: MOALDM forward budget; discussions with MOALDM staff; World Bank analysis.

Given the high proportion of expenditures on nonpublic goods, the potential for cost recovery is significant. However, current levels of cost recovery are extremely low. Total sales and fees were only about 1 percent of total gross ministry expenditures.[15] If we instead focus only on the subset of expenditure items where there was currently some cost recovery, sales and fees represented less than 6 percent of gross or 8 percent of recurrent expenditures on those items. Several of these services yield largely private, excludable benefits for which increased cost recovery is both feasible and desirable. Artificial insemination services and veterinary clinical services, for example, each recovered only about 3 percent of their costs. At a minimum, such services should recover much of their operating (recurrent) expenditures.

As discussed above, less cost recovery may be justified on grounds of poverty alleviation. However, while a full poverty assessment was not possible, it does not appear

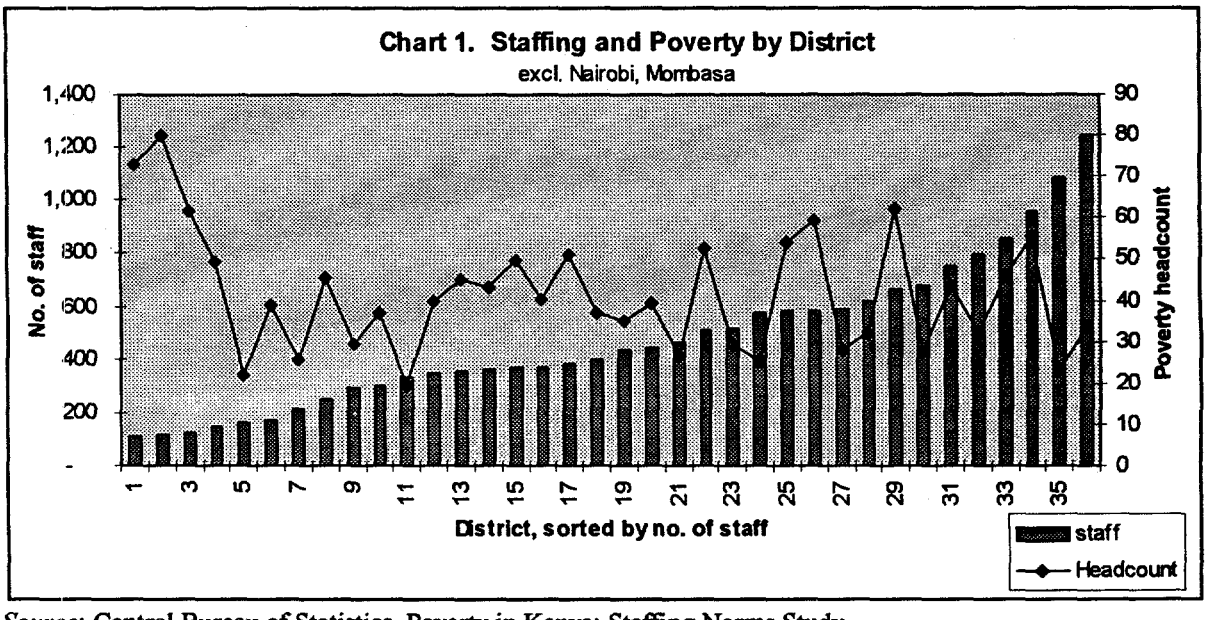
[13] For a more detailed and comprehensive analysis, see Suthiwart-Narueput (forthcoming).

[14] Related sectoral expenditures (e.g., rural roads) are covered under other projects under preparation.

[15] The data are from FY ending 6/30/95 which were the most recent actual expenditures (as opposed to budget estimates) available at the time of the mission.

likely that current ministry expenditures have a strong impact on poverty alleviation. First, many of the goods and services being subsidized do not seem to be those likely to be used more heavily by poorer farmers. Subsidizing artificial insemination services, for example, benefits relatively well-off farmers with more breeding animals more than poorer ones, who will have fewer stock. Similarly, subsidizing tractor hire services is likely to benefit richer farmers more than poorer ones

Second, there appears to be no mechanism by which services are targeted toward the poorest.[16] In the absence of more detailed data, Chart 1 plots staffing against the poverty headcount ratio (ratio of number of poor individuals to total number of individuals in population surveyed) by district.[17] The analysis clearly indicates that resources are not targeted toward poorer districts. One obvious objection is that poorer districts may have little agricultural potential which do not warrant targeting much MOALDM resources. However, it implies limited justification for ministry expenditures on poverty alleviation grounds, and argues strongly for much larger cost recovery.



Source: Central Bureau of Statistics, Poverty in Kenya; Staffing Norms Study.

Given the data available, it was not possible to perform a full-fledged expenditure-outcome analysis. In the absence of information regarding the relationship between outputs and outcomes, we focus instead on the relationship between inputs and outputs. As one indication of technical efficiency within extension, Table 2 lists summary statistics regarding the annual number of farm and group visits per agricultural staff by district. The number of farm and group visits per agricultural assistant (AA) and assistant agricultural officer (AAO), for example, varies hugely by district, from a low of 15 to a high of 715, with a mean and

[16] Indeed, given the inadequate state of data at the ministry, it is not clear how services could be effectively targeted toward the poor.

[17] Note that the chart actually understates this effect because they exclude urban areas such as Nairobi, which has by far the highest number of staff (1,538).

median of 268 and 226. The median number of visits works out to less than one visit per staff per working day.[18] By any measure, this appears to indicate a rather low level of staff productivity.

Table 2. Farm and Group Visits per Agricultural Staff

	Farm/ AA	*Farm/ AAO, AA*	*Farm, Group/ AAO, AA*
Median	278.9	217.9	226.1
Mean	319.7	249.6	268.4
Minimum	13.7	11.6	14.5
Maximum	868.1	710.2	714.8

Source: Department of Agriculture Provincial Annual Reports 1995, 1996; Staffing Norms Study.

While it may be argued that much of the low productivity was due to insufficient funding for transportation for extension workers (e.g., fuel and vehicle maintenance), this is a problem of poor resource allocation and management rather than of inadequate resources *per se*. It is difficult to argue that extension as a whole receives insufficient resources. Under the 1997/98 estimates, the extension core function cost 141.9 million KP. This is far greater than the entire budget (recurrent and development) for the Ministry of Transport and Communications (70.1 million in the 1996/97 estimates).

Since a full expenditure-outcome analysis was not possible, we also rely upon selected cost-benefit analyses. Detailed, representative farm budgets from four agro-ecological zones (AEZ) are used to conduct cost-benefit analyses (CBA) summarized in Table 3. Given the limitations of cost-benefit analysis discussed above, the focus is less on deriving exact return figures, but instead on the implications for intervention.

Table 3. Indicative Benefit-Cost Analysis
(Ksh per representative farm)

Agro-ecological zone	*Baseline*	*Best practice/extension*	*Seeds*	*Crop mix*	*Soil, water conservation*
Profits from increased yields					
Upper highlands	45,779	65,409	47,478	56,997	64,045
Upper midlands	92,061	178,114	92,781	120,231	118,715
Lower midlands	11,498	16,816	18,854	11,498	20,790
LM and below	5,545	8,707	8,063	5,545	7,805
*Estimated IRRs**					
Upper highlands		42%	(+)	(+)	45%
Upper midlands		>100%	(+)	(+)	>100%
Lower midlands		–18%	(+)	nil	(–)
LM and below		(–)	(+)	nil	(–)

* Includes estimates of on-farm and public costs; (+/-) indicates +/- return with undefined IRR.

While purely indicative, the analysis yields several interesting implications. First, there are several interventions which have limited budgetary implications but yield substantial

[18] Excluding holidays. Given the extreme range of values, the median may be a better overall indicator.

benefits. These include improving the access of small-scale farmers to improved seeds by lifting import restrictions on seed, and encouraging changes in crop mix from maize to cash crops in the Upper Highlands (UH) and Upper Midlands (UM).

Second, incremental farm profits are much higher in the Upper Highlands and Upper Midlands, but much lower in the Lower Midlands and Lower Midlands and Below. This suggests that (i) interventions in the former two AEZs have the potential for substantial cost recovery; and (ii) alternative interventions for poverty alleviation may be preferable in the latter two AEZs.

Third, there appears to be a very large yield gap between average and best practice. The best practice/extension column provides an indication of the incremental profits that could potentially be realized if optimal techniques were employed on the representative farms in the four AEZs. The last column indicates the incremental profits from increased yields due to improved soil and water conservation. In the UHM, the benefits for both interventions are so high that *if realized,* they completely overwhelm the costs of intervention. For best practice/extension, for example, even if it is assumed that benefits are realized with only a 20 percent probability, the IRRs are extremely high. This suggests that at least in the UH and UM, the critical issue is less the cost per extension visit, but whether the benefits will be realized or not.

Incorporate Results into Forward Budget

At the time of writing, the Kenya ASIP forward budget has not been finalized. However, to incorporate the results of the above analysis, the proposed budget should reflect the following:

- *Privatization of goods and services which are largely private in character* (e.g., artificial insemination and veterinary clinical services). Within the appropriate time-frame, there should be no allocation from the public budget for these types of goods and services. The actual time-profile of expenditure allocation will depend upon the particular activity. In certain cases, allocations may increase in the near term to fully fund the activity to facilitate privatization. In other instances it may be more appropriate first to commercialize the activity and then reduce the size of the public subsidy gradually over time.

- *Increased cost recovery for many goods and services* (e.g., training schools, extension services). Other things equal, this should translate into reduced net expenditure on these services in the forward budget. Explicit cost recovery targets should be established by activity and by year (e.g., as a percentage of operating expenses). The precise level of cost recovery may be a matter of some debate, but the fact that current levels are so low provides a lot of room to maneuver.

- *Reallocation to improve incidence of expenditures on poverty.* There are two dimensions: by item and district. Net expenditures should be reallocated away from goods and services that are more likely to be used by better-off farmers (e.g., tractor hire or agricultural mechanization services) and from richer districts. Note that the emphasis is on net rather than gross allocations. Whereas richer districts are likely to have higher agricultural potential and warrant more resources, cost recovery can also

be improved in these areas. The CBA using representative farm budgets also suggests that extension may not be the best way of alleviating poverty in certain AEZs.

Aside from expenditure reallocation, the analysis also suggested the need for several process improvements. The low levels of technical efficiency observed in extension, for example, probably reflect both poor budgeting (e.g., inadequate releases of nonwage operating expenditures to allow extension visits to take place), as well as limited incentives for efficient service delivery. The SIP incorporates two important process improvements to address these deficiencies.

- *The budget will be reordered to represent the core versus noncore functions of the government in the sector.* This will help get critical services fully-funded before less critical services.
- *A new, district-level, activity-based budgeting system will be introduced on a pilot basis for 13 districts.* This will link explicit performance criteria to improve monitoring and accountability. While technical efficiency is low, performance criteria should focus heavily on impact and outcome indicators (e.g., yield improvements and increased farm household incomes) as opposed to process indicators (e.g., number of visits per worker). As the CBA for extension indicated, the benefits from improved yields—*if realized*—overwhelm any reasonable cost per visit. This suggests that the critical risk in extension is less the cost per visit but that the benefits fail to get realized.

By and large, many of the above changes are not reflected in the forward budget as it currently stands. Improved cost recovery, for example, should be clearly reflected as a separate budget category for each activity. Expenditure allocations should be tracked at the district level to assess whether they are "pro-poor" or not. This partly reflects the limitations of the current budgeting system, and some of these deficiencies may be alleviated as a new, district-level, activity-based budgeting system is introduced on a pilot basis for 13 districts. This new system will also allow expenditures to be linked to explicit performance criteria to improve monitoring and accountability. *It is difficult to see how many of the needed changes could be implemented under the current budgeting system. This suggests that the new, district-level, activity-based budgeting system is an absolutely critical component of the ASIP.*

However, even within the confines of the current budgeting system, the forward budget inadequately reflects desirable changes. First, and most importantly, there is still far too much emphasis in the forward budget on private rather than public goods. The share of public goods does not seem to increase at all, while the share of largely private goods does. Second, the budget headings are still fragmented. This makes the total amount of resources going toward particular activities less transparent. Veterinary services and livestock extension and marketing, for example, appear across several different core functions. It should be emphasized from the outset that the following figures and analyses are preliminary. However, the qualitative findings are not likely to be reversed with more precise figures.

We classify MOALDM expenditures into whether they are overhead; largely public; private with large externalities; and largely private. Table 4 compares the relative shares in 1995/96 (the last year for which actual expenditures are currently available) with the relative shares in the 3-year, 1998/2001 forward budget. Two features emerge. First, the share of public expenditures in the forward budget is quite low at 17 percent. Second, the share of

expenditures which are public remains unchanged from 1995/96 to 1998/2001. By contrast, the share of expenditures on largely private goods actually *increases* from 12 to 17 percent. The latter is particularly worrisome because the impact of the SIP depends upon changes to the expenditure portfolio.

Table 4. MOALDM Expenditures
(percent)

KP 000s	*Actual 1995/96*	*Estimated 1997/98*	*Projected 1998/99*	*Total 1998/01*
Shares				
Overhead	16	17	17	15
Largely public	17*	18	15	17*
Private with externalities	56	54	49	51
Largely private	12*	1	20	17*

* Preliminary.

It is also useful to analyze the decomposition of the expenditure changes. Total actual expenditures were 200 million KP (actual) in 1995/96, and are 320 million KP in 1998/99, the first year of the 3-year forward budget. This represents a nominal increase of 120 million KP. Table 5 provides a partial list of how this increase is distributed. These four items or areas alone account for over 70 percent of the net increase in expenditures between 1995/96 and 1998/99. The nature of the increases is worrisome. Over 20 percent of the increase are on largely private goods with few externalities—cold storage facilities and pig production services. Another 30 percent is on extension, which while it may generate externalities, provides largely private benefits. Nearly another 20 percent is on general administration and planning, which consists largely of overhead rather than directly productive services. Because general administration and planning should have a large fixed cost component, it is not clear why it should account for such a large share of the increase in expenditures.

Table 5. MOALDM Expenditures
(percent)

Distribution of 120 million expenditure increase from 1995/96–1998/99	
Agricultural extension[1]	30.0
General administration & planning	18.7
Construction of cold storage facilities	14.8
District pig production services	6.6
Subtotal	70.1

1. Includes the following budget codes: 237.000, 238.000, 634.000, 635.000, 660.000, 661.000, 235.000, 255.000, 638.000, 639.000, 271.000.

5. Conclusion

In this paper, we have focused on how to use economic analysis to help SIPs improve the development impact of public expenditures. The analysis emphasized using standard principles of public expenditure analysis to identify desirable changes to the sectoral expenditure program, and evaluating the degree to which the forward expenditure program under the SIP incorporates these changes. One of the most important criteria is that such forward

expenditures should have a clear public rationale, motivated on grounds of either market failure or poverty alleviation.

References

Devarajan, Shantayanan, Lyn Squire, and Suthiwart-Narueput. 1997. "Beyond Rate of Return: Reorienting Project Appraisal." *World Bank Research Observer* 12(1): 35–46.

Hammer, Jeffrey S., Ijaz Nabi, and James Cercone. 1995. "Distributional Effects of Social Sector Expenditures in Malaysia, 1974 to 1989." In Dominique van de Walle and Kimberly Nead, eds., *Public Spending and the Poor: Theory and Evidence.* Baltimore and London: Johns Hopkins University Press.

Harrold, Peter. 1995. *The Broad Sector Approach to Lending: Sector Investment Programs.* World Bank Discussion Paper 302. Washington, D.C.

Squire, Lyn, Shantayanan Devarajan, and Sethaput Suthiwart-Narueput. 1997. "Performance Monitoring Indicators." DECRG mimeo.

Suthiwart-Narueput, Sethaput. (forthcoming). "Kenya ASIP: Economic Analysis Background Paper." DECRG mimeo.

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